RLH Industries, Inc.

USER GUIDE

The leader in rugged fiber optic technology.

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RLH 3+2 Port, Hardened Ethernet Fiber Switch

3+2 PORT SLIMLINE DIN MOUNT

RLH 3+2 SlimLine DIN Mount Ethernet Fiber Switch

ETHERNET OVER FIBER

Introduction

The RLH 3+2 Port SlimLine Ethernet Over Fiber switch is a hardened, DIN mountable multifunction switch that supports 10/100M Ethernet communications over fiber optic cable. Fiber optics not only provide the long distance Ethernet transmission capability up to 74 miles (120km), but also provide immunity to EMI/RFI and transient surges.

The switch has 3 copper 10/100M ports and 2 fiber optic 100Base-FX multimode or single-mode ports. The two fiber ports allow daisy-chaining of multiple switches, using fiber to create multiple TP access points, extend a network connection, connect to another RLH Ethernet Fiber switch or any 100Base-FX device.

It is DIN rail mountable, and housed in a rugged aluminum alloy enclosure that requires only 34mm of rack space. It features convenient network status LEDs, auto negotiation and auto MDI/MDI-X.

Key Features

- Ideal for critical, high voltage, remote or un-manned locations that must remain operating 24/7/365
- Compatibility with IEEE 802.3 10Base-T UTP, 100Base-TX, and 100Base-FX Devices
- RJ45 UTP ports with 10/100 auto-negotiation
- MDI-II/MDI-X auto detection
- Extends network span up to 1.2 miles (2km) on multimode and up to 74 miles (120km) on single-mode fiber
- Dual fiber ports permit daisy-chaining and expandability
- Environmentally hardened to operate in -40˚F to +167˚F (-40˚C to +75˚C) environments
- DIN rail mount
- Covered by a 5 year warranty

Contents

Introduction 1
Key Features 1
General Safety Practices 2
Special Handling Requirements 2
Acronyms 2
Applications 4
Installation 5
LED Indicators 6
Troubleshooting 6
Ordering Information 7
Specifications 8
Warranty 9
Technical Support 9

Specifications subject to change without notice.

General Safety Practices

Intended Audience

This guide is intended for use by knowledgeable telco/network installation, operation and repair personnel. Every effort has been made to ensure the accuracy of the information in this guide is accurate. However, due to constant product improvement, specifications and information contained in this document are subject to change without notice.

Conventions

Symbols for notes, attention, and caution are used throughout this manual to provide readers with additional information, advice when special attention is needed, and caution to prevent injury or equipment damage.

The equipment discussed in this document may require tools designed for the purpose being described. RLH recommends that service personnel be familiar with the correct handling and use of any installation equipment used, and follow all safety precautions including the use of protective personal equipment as required.

Caution - Severe Shock Hazard

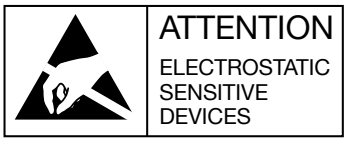
- Never install during a lightning storm or where unsafe high voltages are present.
- Copper network wires may carry high DC voltages. Use caution when handling copper wiring.

Warning

The intra-building port(s) of the equipment or subassembly is suitable for connection to intrabuilding or unexposed wiring or cabling only. The intra-building port(s) of the equipment MUST NOT be metallically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 4 ports as described in GR-1089-CORE, Issue 4) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.

Special handling requirements

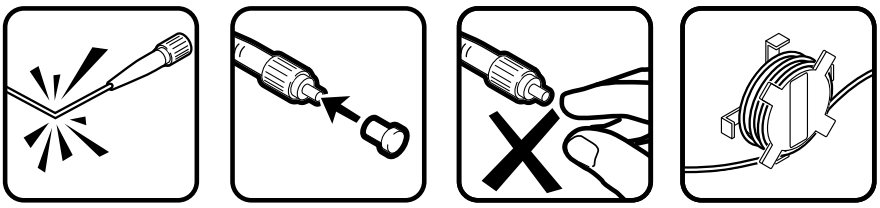
Be careful when handling electronic components



- This product contains static sensitive components.
- Do not open the enclosure, there are no user serviceable parts.
- Follow proper electrostatic discharge procedures.

This product utilizes circuitry that can be damaged by static electricity. Before installing, discharge static electricity on your body by physically making contact with earth ground. Failure to follow ESD precautions may cause damage to the unit and prevent proper operation.

Guidelines for handling terminated fiber cable



- Do not bend fiber cable sharply. Use gradual and smooth bends to avoid damaging glass fiber.
- Keep dust caps on fiber optic connectors at all times when disconnected.
- Do not remove dust caps from unused fiber.
- Keep fiber ends and fiber connectors clean and free from dust, dirt and debris. Contamination will cause signal loss.
- Do not touch fiber ends.
- Store excess fiber on housing spools or fiber spools at site

Acronyms

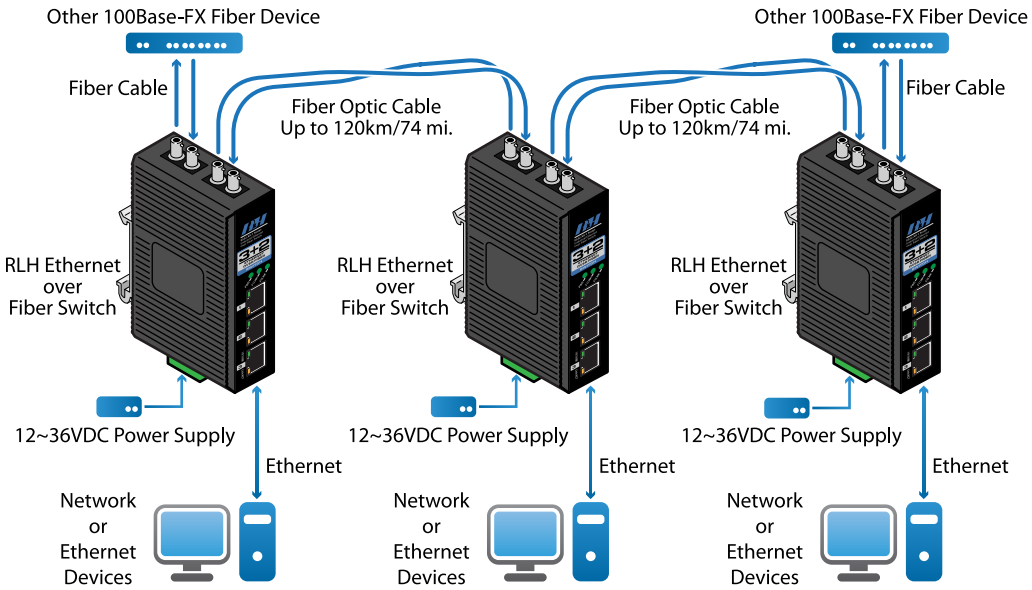
Commonly used acronyms and abbreviations

Acronym/Abbreviation	Description
UTP	Unshielded Twisted Pair (commonly used in Ethernet networks)
TP	Twisted Pair (same as UTP)
TX	Transmit
RX	Receive
PWR	Power
LED	Light Emitting Diode
GRN	Green
ORG	Orange

Applications

Network equipment in high voltage areas can be at risk due to Ground Potential Rise (GPR). A copper network cable referenced to a remote ground can become a path for high voltages during a ground fault. Use of all-dielectric fiber optic cable instead of copper completely eliminates the presence of a remote ground, which dramatically increases safety of personnel and reliability of equipment. By using fiber optic cable, the 3+2 10/100 Ethernet over fiber switch provides absolute electrical isolation between both ends of the network.

Copper twisted pair Ethernet is limited to 100m/328ft without extenders. Using fiber optic cable provides long distance service up to 120km/74mi. without any additional equipment. Optical fiber is immune to EMI/RF interference, ground loops, and high voltage surges from lightning or ground faults, and is ideal in electrically noisy environments such as near large power sources, electrical motors, and radio communications equipment.



Typical Ethernet System Diagram

Each 3+2 Ethernet Switch may be connected to another switch as shown in the diagram above, extending the network and creating access points. The switch may also be connected to other RLH switches, fiber converters and other 100Base-FX fiber based networking devices.

Installation

Prior to installation:

- Check for shipping damage
- Check the contents to ensure correct model and fiber type
- Have a clean, dry, DIN rail or wall mount installation environment ready

Required for installation:

- 12~36VDC local power source

Note: To maintain high voltage isolation, units at each end must be powered from separate isolated power sources.

Connect fiber optic cable

Multimode and single-mode Ethernet cards are equipped with dual ST, SC or FC female optical connectors, or a single bi-directional connector, depending on the model.

Connect fibers to the TX (Transmit) and RX (Receive) optical connectors. For dual fiber models, the TX connector must go to the RX connector on the unit at the other end. The other end of the fiber may be connected to another SlimLine 10/100 Ethernet converter or any compatible 100Base-FX Fiber Optic Ethernet device. Either fiber port (F1 or F2) may be connected to another switch since all ports are shared.

For bi-directional, single fiber models, there is only one connector used for transmitting and receiving. Bi-directional units must be used in pairs.

Note: Fiber cable should always be routed loosely avoiding tight bends.

Connect Ethernet cable

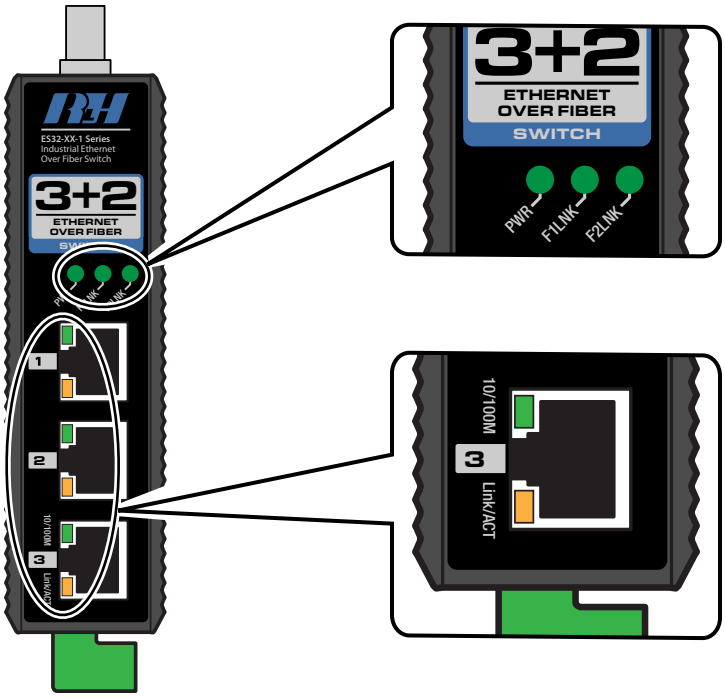
The 10/100/Base-T copper connection is made via the RJ45 port. The TP port is auto-negotiating and requires no additional settings.

Connect Power

Attach a FG ground wire to the ground screw on the housing. Alternately, attach a ground wire to the FG terminal on the power connector. Connect a local 12~36VDC power supply to the power input terminals.

Note: The power terminals are polarity sensitive. Attach the Positive DC wire to the V+ terminal.

LED Indicators



Indicator	Color	LED	Description
PWR	GRN	ON	System power is present
		OFF	System power is disconnected
F1LNK	GRN	ON	Fiber link OK
		OFF	Fiber link FAIL
F2LNK	GRN	ON	Fiber link OK
		OFF	Fiber link FAIL
10/100M	GRN	ON	TP port speed is 100M
		OFF	TP port speed is 10M
LINK/ACT	ORG	ON	Established network connection
		Blinking	TP port activity
		OFF	No network connection established

Troubleshooting

If trouble is encountered, verify all copper and fiber connections. Refer to the LED Indicators on of the unit. They show availability of power, modes of operation, and data being received by the fiber and TP ports.

If trouble persists, replace the unit and retest. If technical assistance is required, contact the RLH Industries, inc. technical support department:

800-877-1672 (6 am to 6 pm- PST),
or call our 24/7 Technical/Customer Service: (714) 366-2503 or (714) 457-5740

Specifications subject to change without notice.

Ordering Information

ES32 - XX -1

Product Designation

Configuration Code

Model Designation

Code	Multimode	Single Mode	Single Fiber Bi-Directional	Dual Fiber	SC Connector	ST Connector	FC Connector	Range					FXO/CO Side	FXS/Sub Side	Either Side
								2km/1.25mi.	20km/12.4 mi.	40km/24.9 mi.	60km/37 mi.	120km/74 mi.			
01	●		●		●			●					●		
02	●		●		●			●						●	
03	●			●	●			●							●
04	●			●		●		●							●
05	●			●			●	●							●
10		●	●		●				●				●		
11		●	●		●				●					●	
12		●	●		●					●			●		
13		●	●		●					●				●	
14		●	●		●						●		●		
15		●	●		●						●			●	
20		●	●			●			●				●		
21		●	●			●			●					●	
22		●	●			●				●			●		
23		●	●			●				●				●	
24		●	●			●					●		●		
25		●	●			●					●			●	
30		●	●				●		●				●		
31		●	●				●		●					●	
32		●	●				●			●			●		
33		●	●				●			●				●	
34		●	●				●				●		●		
35		●	●				●				●			●	
40		●		●	●				●						●
41		●		●	●						●				●
42		●		●	●							●			●
50		●		●		●			●						●
51		●		●		●					●				●
52		●		●		●						●			●
60		●		●			●		●						●
61		●		●			●				●				●
62		●		●			●					●			●

- Bidirectional single fiber models require a TX unit and a RX unit for a complete system
- Please contact your RLH sales representative for pricing and delivery information

General Specifications

Protocols	100BASE-TX, 10BASE-T, 100BASE-FX				
Standards	IEEE802.3x, IEEE802.3,IEEE802.3U				
Processing Type	Store and Forward, with IEEE802.3x full duplex, non-blocking flow control				
Flow Control	IEEE802.3x flow control, back pressure flow control				
Mac Address	8K				
Forward and Filtrate	14810pps				
System Exchange Bandwidth	4.8G				
Copper Connector	RJ45 UTP, 10/100BaseT(X) auto negotiation speed, Full/half duplex mode, and auto MDI/MDI-X connection, 1000V protection isolation				
Copper Distance	100m / 328 feet				
Fiber connector	ST or SC, 100BaseFX ports (SC/FC/ST connector, single or multi mode)				
	Dual fiber (ST or SC), or single fiber (bi-directional, SC only) connectors				
Fiber types	**Multimode**	62.5/125, 50/125μm			
	Single-mode	9/125μm			
Fiber Distances	**Multimode**	2km/1.2mi.			
	Single-mode	25km/15.5mi., 40km/23mi., 60km/36mi., 120km/74mi.			
Dual Fiber Optics	**Fiber Type**	**Multimode**		**Single-mode**	
	Wavelength TX/RX (nm)	1310	1310	1310	1310
	Distance	2km / 1.2mi.	20km / 12mi.	60km / 36mi.	120km / 74mi.
	Min. TX PWR (dBm)	-18	-15	-6	0
	Max. TX PWR (dBm)	-10	-8	-3	+5
	RX Sensitivity (dBm)	-31	-34	-34	-34
	Link Loss Budget (dBm)	13	19	28	34
Single Fiber Optics (Bi-directional)	**Fiber Type**	**Multimode**		**Single-mode**	
	Wavelength (nm)	1550	1550	1550	1550
	Distance	2km / 1.2mi.	20km / 12mi.	40km / 25mi.	60km / 36mi.
	Min. TX PWR (dBm)	2-17	-14	-9	-5
	Max. TX PWR (dBm)	-10	-8	-5	-3
	RX Sensitivity (dBm)	-31	-34	-34	-34
	Link Loss Budget (dBm)	14	20	25	29
LED Indicators	**F1LINK**	Fiber port link - ON: link OK, OFF: link fail, Blink: activity			
	F2LINK	Fiber port link - ON: link OK, OFF: link fail, Blink: activity			
	10/100M	TP port speed - ON: 100m, OFF: 10M			
	LINK/ACT	TP port link - ON: link OK, OFF: link fail, Blink: activity			
	PWR	Power - ON: power applied, OFF: no power			
Power Input	24VDC (12~36VDC) 300mA				
Overload Current Protection	1.1A				
Dimensions	W1.33" x H4.1" x D3.1" (34mm x 104mm x 79mm)				
Weight	350g				
Housing	Aluminum alloy, IP30 protection				
Temperature	**Operating**	-40˚F to +167˚F (-40˚C to +75˚C)			
	Storage	-45˚F to +185˚F (-45˚C to +85˚C)			
Humidity	10~95% non-condensing				

Warranty

RLH is recognized throughout the U.S. in the telecommunications industry for our experience and we stand with total confidence in our quality. This product is warranted to be free of defects in material and workmanship for up to 5 years of service.

RLH Industries, Inc. will repair or replace these products that fail provided the defective part is returned to RLH freight prepaid.

To make a warranty claim, or schedule repair or replacement of your RLH product, please contact us for an RMA number. You will be promptly assisted by one of our warranty specialists. All returns must have an RMA number before we can receive any items.

Technical Support

Email:	support@fiberopticlink.com
24/7 technical support:	Toll Free 1-855-RLH-24X7 Toll Free 1-855-754-2497

Contact Information

Corporate Headquarters:	RLH Industries, Inc. 936 N. Main Street Orange, CA 92867 USA
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